



LEIA Safety Information Sheet

HAND-ARM VIBRATION

Prepared by the LEIA Safety and Environment Committee

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PREAMBLE

This Information Sheet is one of a series produced by the LEIA Safety and Environment Committee on topics relevant to the Lift and Escalator Industry. Whilst every effort has been taken in the production of these sheets, it must be acknowledged that they should be read in conjunction with the relevant legislation, codes of practice etc. They should not be taken as an authoritative interpretation of the law but guidance to it.

INTRODUCTION

Regular and frequent exposure to vibration transmitted into workers hands and arms from power tools and similar equipment can cause a range of health conditions collectively known as Hand Arm Vibration Syndrome (HAVS). The most well-known effect is Vibration White Finger, but other effects include damage to sensory nerves, muscles and joints in the hands and arms.

Regular and frequent exposure to high levels of vibration through the hands from handheld tools can cause permanent damage to the hands and arms.

Key messages from the HSE

- HAVS is preventable, but once the damage is done it is permanent.
- HAVS is serious and disabling, and nearly 2 million people are at risk.
- Damage from HAVS can include the inability to do fine work and cold can trigger painful finger blanching attacks.

Symptoms

Regular and frequent exposure to hand-arm vibration can lead to two forms of permanent ill health known as:

- hand-arm vibration syndrome (HAVS); and
- carpal tunnel syndrome (CTS).

Symptoms and effects of HAVS include:

- tingling and numbness in the fingers which can result in an inability to do fine work (for example, assembling small components) or everyday tasks (for example, fastening buttons).
- loss of strength in the hands which might affect the ability to do work safely.
- the fingers going white (blanching) and becoming red and painful on recovery,
- reducing ability to work in cold or damp conditions, e.g. outdoors.

Symptoms and effects of CTS can also occur and include:

- tingling, numbness, pain and weakness in the hand which can interfere with work and everyday tasks and might affect the ability to do work safely.

Symptoms of both may come and go, but with continued exposure to vibration they may become prolonged or permanent and cause pain, distress and sleep disturbance. This can happen after only a few months of exposure, but in most cases, it will happen over a few years.

Legal Requirements

The Control of Vibration at Work Regulations 2005 requires exposure to vibration to be reduced so far as is reasonably practicable.

The regulations set two daily limits:

Exposure action value	of 2.5m/s ² A(8)	if this value is exceeded action is required
Exposure limit value	of 5.0m/s ² A(8)	this limit must not be exceeded.

Insulation, Protection and Placing of Conductors

All conductors in a system which may give rise to danger shall either:-

- a) be suitably covered with insulating material and as necessary protected so as to prevent, so far as is reasonably practicable, danger; or
- b) have such precautions taken in respect of them (including, where appropriate, their being suitably placed) as will prevent, so far as is reasonably practicable, danger.

To determine exposure

To determine daily vibration exposure [A(8)] value it is necessary to first determine the exposure time and the vibration emission of the tool. Exposure time is the actual trigger time (time spent physically operating the tool) not the length of a shift.

This can be determined either by:

- a) observation of working practice
- b) estimation (e.g. 20 holes @ 30 seconds each)

Vibration emission of tool can be determined from tool handbook, manufacturer's data, internet databases and actual measurement. Typical vibration for a hammer drill is 9 m/s² and for a small angle grinder 6 m/s².

Once the exposure time and the vibration emissions are known then use online calculator available at <http://www.hse.gov.uk/vibration/hav/vibrationcalc.htm>

to determine if the Exposure Action Value or Exposure Limit value are being reached. Alternatively, the chart below is a quick reference.

So how long can I use a tool for?

The following is a guide to the vibration exposure that an operator could potentially receive when using an item of equipment. It should be noted that different makes of tools and different models of the same tool can give differing levels of exposure, subject to the age of the machine and the materials involved with the cutting/drilling. The calculations are based on equipment that is widely used in the industry and the timings are based on 10 minutes 'trigger time'. Care should be taken to be aware of how much trigger time each person is using a piece of equipment for and the total time for all items of equipment used during the normal working day.

Tool	Partial Exposure m/s ²	Partial Exposure Points
DeWalt 18v SDS drill	1.0	15
DeWalt 18v driver	0.3	1
DeWalt 18v angle drill	0.5	4
Makita 4" grinder	1.0	16
Makita 11v hammer drill	1.9	56
Bosch 9" grinder	1.1	19
Hitachi reciprocal saw	3.4	181

The Vibration Regulations state that ‘a daily EAV (exposure action value) of 2.5m/s² represents a clear risk that requires managing’. This means when using a lot of power tools during the working day, a note needs to be made by each user/operator of how much ‘trigger time’ they have been exposed to and to not exceed 2.5m/s² each day.

Vibration magnitude m/s ²	40	800									
	30	450	900								
	25	315	625	1250							
	20	200	400	800							
	19	180	360	720	1450						
	18	160	325	650	1300						
	17	145	290	580	1150						
	16	130	255	510	1000						
	15	115	225	450	900	1350					
	14	98	195	390	785	1200					
	13	85	170	340	675	1000	1350				
	12	72	145	290	575	865	1150	1450			
	11	61	120	240	485	725	970	1200	1450		
	10	50	100	200	400	600	800	1000	1200		
	9	41	81	160	325	485	650	810	970	1300	
	8	32	64	130	255	385	510	640	770	1000	1200
	7	25	49	98	195	295	390	490	590	785	865
	6	18	36	72	145	215	290	360	430	575	720
	5.5	15	30	61	120	180	240	305	365	485	605
	5	13	25	50	100	150	200	250	300	400	500
	4.5	10	20	41	81	120	160	205	245	325	405
	4	8	16	32	64	96	130	160	190	255	320
	3.5	6	12	25	49	74	98	125	145	195	245
	3	5	9	18	36	54	72	90	110	145	180
	2.5	3	6	13	25	38	50	63	75	100	125
	2	2	4	8	16	24	32	40	48	64	80
	1.5	1	2	5	9	14	18	23	27	36	45
	1	1	1	2	4	6	8	10	12	16	20
		15 m	30 m	1 h	2 h	3 h	4 h	5 h	6 h	8 h	10 h
		Daily exposure time									

Source HSE:L140

Note points values are also given which help if more than one tool per day is used. Add the points together arithmetically for each tool at each point of exposure.

100 points = Exposure Action Level (equates to 2.5 m/s² (A(8)))

400 points = Exposure Action Level (equates to 5.0 m/s² (A(8)))

If calculated value is below 2.5 m/s^2 (A(8)) and no action is reasonably practicable to reduce the vibration then no further action is necessary. This is low risk.

If the calculated value is between 2.5 m/s² (A(8)) and 5.0 m/s² (A(8)) then risk controls must be implemented.

For examples of possible risk control measure see Appendix 1.

If the calculated value is above $5.0 \text{ m/s}^2 \text{ A (8)}$ this is too much. The daily exposure limit is being exceeded and activity must cease.

References

Risk Controls include:

- consider alternative work method avoiding a vibrating tool if possible
- selecting or hiring non vibration tools
- where appropriate, maintain vibrating tools
- use sharp drills, replace consumables such as grinding wheels, so equipment is efficient
- limit time employees are exposed to vibration
- share exposure between employees
- provide protective clothing in cold conditions
- keep hands warm and dry – gloves will keep hands warm but do not provide any protection from vibration
- introduce a health surveillance program to detect any adverse health effects.

(Note: Health surveillance is required where employees are exposed to vibration at or above the EAV of $2.5 \text{ m/s}^2 \text{ A (8)}$ or where indicated by your own risk assessment)

APPENDIX 1

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